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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/978,275	10/17/2001	Masahiko Yamada	Q66727	4449

7590 10/06/2005

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EXAMINER	
MACKOWEY, ANTHONY M	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 10/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/978,275	YAMADA, MASAHIKO
	Examiner	**Art Unit**
	Anthony Mackowey	2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14-19* is/are allowed.

6)☒ Claim(s) *1-13,20,21 and 32-41* is/are rejected.

7)☒ Claim(s) *22-31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 October 2001 and 27 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see page 18, filed June 27, 2005, with respect to the objection to the drawings have been fully considered and are persuasive. The objection to the drawings has been withdrawn.

Applicant's arguments, see pages 21 and 22, filed June 27, 2005, with respect to the rejection of claims 14-19 under 35 U.S.C. 103(a) have been fully considered and are persuasive. The rejection of claims 14-19 has been withdrawn.

Applicant's arguments with respect to claims 1-13, 20 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 32-36 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 32-36 rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: The conditions for which f(x) equals the different values have been omitted (S<100; 100<=S<=2000; S>2000). The claims identify three different values for

f(x), however, "wherein f(x) is a function of the exposure dose" does not adequately describe the conditions for the different values of f(x).

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7-13, 20, 21 and 37-41 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,461,655 to Vuylsteke et al. (hereafter "Vuylsteke").

Regarding claim 1, Vuylsteke discloses an apparatus for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), comprising:

a smoothing unit which processes said input image signal by using a smoothing filter so as to smooth said radiographic image (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46, Vuylsteke teaches a noise reduction unit that performs smoothing at different resolution levels and reconstructs a processed image from the attenuated detail transform images.); and

a characteristic calculation unit which obtains at least one first characteristic of said input image signal by calculation using a function based on information indicating an exposure dose with which said radiographic image has been produced (col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances

described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.);

said smoothing unit adapts at least one second characteristic of the smoothing filter to said input image signal based on said at least one first characteristic (col. 9, lines 42-58, Equation 1, Vuylsteke teaches the noise suppression function is based on the calculated variances.).

Regarding claim 2, Vuylsteke further discloses a band-limited image-signal generation unit which generates a plurality of band limited image signals respectively representing a plurality of band-limited images belonging to a plurality of different frequency bands base on said input image signal (col. 7, lines 9-13, 37- col. 8, line 3, Vuylsteke teaches a decomposition unit which applies a low pass filter to the input image to create a plurality of detail images.);

said smoothing unit processes said plurality of band-limited image signals by using said smoothing filter so as to smooth each of said plurality of band-limited images (col. 8, lines 22-26; col. 10, lines 4-6, Vuylsteke teaches noise reduction process repeated for all detail images.).

Regarding claim 3, Vuylsteke further discloses said band-limited-image-signal generation unit generates said plurality of band-limited image signals by performing multiresolution decomposition of said input image (col. 7, lines 9-13, Vuylsteke teaches the original image is decomposed into a sequence of detail images, which represent the amount of detail present in the original image at multiple resolution levels.).

Regarding claim 7, Vuylsteke discloses a method for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), said method comprising the steps of:

(a) obtaining at least one first characteristic of said input image signal by calculation using a function based on information indicating an exposure dose with which said radiographic image has been produced (col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.);

(b) adapting at least one second characteristic of a smoothing filter to said input image signal based on said at least one first characteristic (col. 9, lines 42-58, Equation 1, Vuylsteke teaches the noise suppression function is based on the calculated variances.); and

(c) processing said input image signal by using said smoothing filter so as to smooth said radiographic image (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46, Vuylsteke teaches a performing smoothing at different resolution levels and reconstructing a processed image from the attenuated detail transform images.).

Regarding claim 8, Vuylsteke does not explicitly recite "a computer-readable storage medium storing a program which instructs a computer to execute a method." The apparatus Vuylsteke describes clearly performs computations on digital pixel values, has memory and can output a viewable image on a display screen (CRT) (col. 6, lines 1-13). This description of the processing apparatus clearly describes the elements and capabilities of a conventional computer, which inherently have computer-readable storage mediums (including, but not limited to RAM, ROM, Hard drives) in which programs are stored for execution by the computer.

Vuylsteke further discloses a method for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), said method comprising the steps of:

(a) obtaining at least one first characteristic of said input image signal by calculation using a function based on information indicating an exposure dose with which said radiographic image has been produced (col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.);

(b) adapting at least one second characteristic of a smoothing filter to said input image signal based on said at least one first characteristic (col. 9, lines 42-58, Equation 1, Vuylsteke teaches the noise suppression function is based on the calculated variances.); and

(c) processing said input image signal by using said smoothing filter so as to smooth said radiographic image (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46, Vuylsteke teaches a performing smoothing at different resolution levels and reconstructing a processed image from the attenuated detail transform images.).

Regarding claim 9, Vuylsteke discloses a method for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), said method comprising the steps of:

(a) generating a plurality of band-limited image signals respectively representing a plurality of band-limited images belonging to a plurality of different frequency bands, based on said image signal (col. 7, lines 9-13, 37- col. 8, line 3, Vuylsteke teaches a decomposing the input image using low pass filtering to create a plurality of detail images representing multiple resolution levels.);

(b) obtaining at least one first characteristic of said input image signal by calculation using a function based on information indicating an exposure does with which said radiographic image has been produced (col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the

specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.);

(c) adapting at least one second characteristic of a smoothing filter to said input image signal based on said at least one first characteristic (col. 9, lines 42-58, Equation 1, Vuylsteke teaches the noise suppression function is based on the calculated variances.); and

(d) processing said plurality of band-limited image signals by using said smoothing filter so as to smooth each of said plurality of band-limited images (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46, Vuylsteke teaches a performing smoothing on the different resolution level images.).

Regarding claim 10, Vuylsteke does not explicitly recite “a computer-readable storage medium storing a program which instructs a computer to execute a method.” The apparatus Vuylsteke describes clearly performs computations on digital pixel values, has memory and can output a viewable image on a display screen (CRT) (col. 6, lines 1-13). This description of the processing apparatus clearly describes the elements and capabilities of a conventional computer, which inherently have computer-readable storage mediums (including, but not limited to RAM, ROM, Hard drives) in which programs are stored for execution by the computer.

Vuylsteke further discloses a method for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), said method comprising the steps of:

(a) generating a plurality of band-limited image signals respectively representing a plurality of band-limited images belonging to a plurality of different frequency bands, based on said image signal (col. 7, lines 9-13, 37- col. 8, line 3, Vuylsteke teaches a decomposing the input image using low pass filtering to create a plurality of detail images representing multiple resolution levels.);

(b) obtaining at least one first characteristic of said input image signal by calculation using a function based on information indicating an exposure does with which said radiographic image has been produced (col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.);

(c) adapting at least one second characteristic of a smoothing filter to said input image signal based on said at least one first characteristic (col. 9, lines 42-58, Equation 1, Vuylsteke teaches the noise suppression function is based on the calculated variances.); and

(d) processing said plurality of band-limited image signals by using said smoothing filter so as to smooth each of said plurality of band-limited images (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46, Vuylsteke teaches a performing smoothing on the different resolution level images.).

Regarding claim 11, Vuylsteke discloses an apparatus for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), comprising:

A band-limited-image-signal generation unit which generates a plurality of band-limited image signals respectively representing a plurality of band-limited images belonging to a plurality of different frequency bands, based on said input image signal (col. 7, lines 9-13, 37- col. 8, line 3, Vuylsteke teaches a decomposition unit which applies a low pass filter to the input image to create a plurality of detail images.);

An index-value obtaining unit which obtains at least one index value indicating a degree of suppression of said noise (col. 9, lines 42-58, Vuylsteke teaches the noise suppression function Sv_n.), the at least one index value corresponding to a function based on information indicating an exposure does with which said radiographic image has been produced (col. 9, lines 42-58; col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the noise suppression function is a function of local variance. Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well-known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can

indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.); and

A noise suppression unit which processes each of said plurality of band-limited image signals so as to suppress noise in each of said plurality of band-limited images based on said at least one index value (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46; col. 10, lines 4-6, Vuylsteke teaches a performing smoothing/noise suppression on the different resolution level images.).

Regarding claim 12, Vuylsteke further discloses wherein said index-value obtaining unit obtains said at least one index value indicating the degree of suppression of the noise for each of said plurality of band-limited image signals (col. 8, line 39-col. 4, lines 58, Vuylsteke teaches the variances are calculated from the detail images obtained from the decomposition stage and computing the noise suppression function based on the variances.), and

said noise suppression unit processes each of said plurality of band-limited image signals so as to suppress the noise in each of said plurality of band-limited images based on said at least one index value obtained for each of said plurality of band-limited image signals (col. 9, line 59 col. 10, line 8, Vuylsteke teaches the noise suppression process is repeated for all detail images.).

Regarding claim 13, Vuylsteke further discloses wherein said index-value obtaining unit obtains said at least one index value indicating the degree of suppression of the noise for each pixel of each of said plurality of band-limited images (col. 9, line 63 – col. 10, line 3, Vuylsteke teaches all variance pixels corresponding to the same level

are fetched from memory and transformed into a sequence of attenuation coefficients, then pixelwise multiplied with pixels of the detail image at the same level.), and

Said noise suppression unit processes each of said plurality of band-limited image signals so as to suppress noise in said each pixel of each of said plurality of band-limited images based on said at least one index value obtained for said each pixel of said each plurality of band-limited images (col. 9, line 59 col. 10, line 8, Vuylsteke teaches the noise suppression process is repeated for all detail images.).

Regarding claim 20, Vuylsteke discloses a method for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), said method comprising the steps of:

(a) generating a plurality of band-limited image signals respectively representing a plurality of band-limited images belonging to a plurality of different frequency bands, based on said input image signal (col. 7, lines 9-13, 37- col. 8, line 3, Vuylsteke teaches a decomposing the input image using low pass filtering to create a plurality of detail images representing multiple resolution levels.);

(b) obtaining at least one index value indicating a degree of suppression of said noise (col. 9, lines 42-58, Vuylsteke teaches the noise suppression function Sv_n.), the at least one index value corresponding to a function based on information indicating an exposure does with which said radiographic image has been produced (col. 9, lines 42-58; col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the noise suppression function is a function of local variance. Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well-known tradeoff

between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.); and

(c) processing each of said plurality of band-limited image signals so as to suppress noise in each of said plurality of band-limited images based on said at least one index value (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46; col. 10, lines 4-6, Vuylsteke teaches a performing smoothing/noise suppression on the different resolution level images.).

Regarding claim 21, Vuylsteke does not explicitly recite "a computer-readable storage medium storing a program which instructs a computer to execute a method." The apparatus Vuylsteke describes clearly performs computations on digital pixel values, has memory and can output a viewable image on a display screen (CRT) (col. 6, lines 1-13). This description of the processing apparatus clearly describes the elements and capabilities of a conventional computer, which inherently have computer-readable storage mediums (including, but not limited to RAM, ROM, Hard drives) in which programs are stored for execution by the computer.

Vuylsteke further discloses a method for suppressing noise in an input image signal representing a radiographic image (col. 1, lines 6-10), said method comprising the steps of:

(a) generating a plurality of band-limited image signals respectively representing a plurality of band-limited images belonging to a plurality of different frequency bands, based on said input image signal (col. 7, lines 9-13, 37- col. 8, line 3, Vuylsteke teaches a decomposing the input image using low pass filtering to create a plurality of detail images representing multiple resolution levels.);

(b) obtaining at least one index value indicating a degree of suppression of said noise (col. 9, lines 42-58, Vuylsteke teaches the noise suppression function Sv_n.), the at least one index value corresponding to a function based on information indicating an exposure does with which said radiographic image has been produced (col. 9, lines 42-58; col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the noise suppression function is a function of local variance. Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well-known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.); and

(c) processing each of said plurality of band-limited image signals so as to suppress noise in each of said plurality of band-limited images based on said at least one index value (col. 6, lines 4-7; col. 3, line 61 – col. 4, line 17, lines 23-46; col. 10, lines 4-6, Vuylsteke teaches a performing smoothing/noise suppression on the different resolution level images.).

Regarding claims 37-41, Vuylsteke further discloses the function is defined by at least a signal value of a pixel and an amount of the exposure does of the radiographic image (col. 1, lines 14-18; col. 8, lines 39-67, Vuylsteke teaches the local variance of pixels and noise variance are computed for the image and that there is a well known tradeoff between image quality and patient does due to the presence of noise in the radiation source. As described in the specification (page 7, line 20 – page 8, line 3) pixel values of the radiographic image are information that can indicate exposure does. The variances described by Vuylsteke are characteristics of the image and are functions of pixel values that are indicative of exposure does.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vuylsteke in view of USPN 6,173,084 to Aach et al. (hereafter "Aach").

Regarding claim 4, Vuylsteke further discloses said characteristic calculation unit obtains said at least one first characteristic of said input image signal based locally calculated from pixel values in a neighborhood of a pixel of interest in at least one of said plurality of band-limited images represented by at least one of said plurality of band-limited image signals (col. 8, lines 36-62, Vuylsteke teaches the local variance

(first characteristic) is computed from an NXN neighborhood of pixel values around the current target pixel (pixel of interest) for each detail image.).

Vuylsteke is silent with regard to calculation of said at least one first characteristic of said input image signal based on second information. However, Aach teaches finding weighted averages of pixel values and the direction in which the neighboring pixel is located in the current detail image with respect to the pixel being filtered and calculating the magnitude of the difference between the pixels in said direction (col. 3, lines 22-35).

The teachings of Vuylsteke and Aach are combinable because they are both concerned with image processing to reduce noise in radiographic images. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus taught by Vuylsteke having the first characteristic calculation be based on first information taught by Vuylsteke and second information taught by Aach in order to avoid blurring the image (col. 3, lines 64 – col. 4, line 4) and preserve edge structures (col. 4, lines 14-45).

Regarding claim 5, Aach further discloses an apparatus wherein said characteristic calculation unit obtains a pixel vector at said pixel of interest in said at least one of said plurality of band-limited images (col. 3, lines 22-35, Aach teaches that the weight factor is obtained by finding the direction of a neighboring pixel with respect the to pixel being filtered and calculating the magnitude of the difference between the pixels in said direction (pixel vector).), and detects an orientation of an edge as said second information (col. 4, lines 14-31) Aach teaches how the weighting factors take

into account the direction and magnitude of gradients and how they indicate an edge), and

said smoothing unit arranges said at least one second characteristic of said smoothing filter so that said radiographic image is smoothed along said orientation of said edge (col. 4, line 14-45, Aach teaches the weighting factors are appropriately calculated according to gradient directions in order to preserve edge structures.).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vuylsteke in view of USPN 5,351,305 to Wood et al. (hereafter "Wood").

Regarding claim 6, Vuylsteke does not disclose said smoothing filter includes for each of a plurality of predetermined directions a plurality of filters respectively smoothing said radiographic image in said plurality of predetermined directions to a plurality of different degrees, and

said smoothing unit adapts said at least one second characteristic of said smoothing filter to said input image signal by selecting one of said plurality of filters based on said at least one first characteristic of said input image signal.

However, Wood discloses a smoothing filter that includes a plurality of filters at predetermined directions (col. 5, lines 7-13, Wood also teaches that the filters are at 10 degree increments), and that the smoothing filter selects one of the plurality of filters based on at least one characteristic of the input image signal (col. 4, lines 61-68, Wood teaches comparing the angle of the edge with the preselected array of directions corresponding to the directions of preselected directional filters.).

The teachings of Vuylsteke and Wood are combinable because they are both in the same field of endeavor, namely smoothing and noise reduction in medical imaging. It would have been obvious to on of ordinary skill in the art at the time the invention was made to modify the apparatus (namely the smoothing unit) of Vuylsteke to include a plurality of directional filters which the smoothing unit selects based on the input image signal as taught by Wood in order to produce better quality images which are smooth across regions of homogeneity while preserving edges regardless of their size or direction. By smoothing along the direction of the edges, the boundaries of image regions are not compromised (Wood, col. 2, line 66 – col. 3, line 3.).

Allowable Subject Matter

Claims 14-19 are allowed.

Claim 14 recites, "said index-value obtaining unit obtains a first evaluation value from a first one of said plurality of band-limited image signals belonging to a first one of said plurality of different frequency bands and a second evaluation value from a second one of said plurality of band-limited image signals belonging to a second one of a plurality of different frequency bands which is lower than said first one of said plurality of different frequency bands, determines weights based on said information indicating the exposure does with which the radiographic image has been produced, for use in a weighted sum of said first and second evaluation values, obtains said weighted sum, and obtains based on said weighted sum said at least one index value indicating the

degree of suppression of the noise for said first one of said plurality of band-limited image signals." Claims 15-17 depend from claim 14.

Claim 18 recites, "said noise suppression unit processes on of said plurality of band-limited image signals so as to generate a transformed image signal, and obtains a weighted sum of said one of said plurality of band-limited image signals and said transformed image signal by using weights determined based on said at least one index value." Claim 19 depends from claim 18.

Claims 22-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 22-26 recite, "wherein the first information represents a S value (indicating a reading sensitivity) and an L value (indicating latitude) of the radiographic image."

Claims 27-31 recites, "wherein the first information represents one of a selected menu item of an apparatus used to obtain the radiographic image, an age of a subject in the radiographic image and information from a photo-timer used to obtain the radiographic image."

Claims 32-36 depend from claims 22-26. Claims 32-36 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

The above features, as explicitly recited, and in combination with the other elements of the base claims and any intervening claims are neither disclosed nor suggested by the prior art of record.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 6,704,437 to He et al. is cited for teaching adaptive smoothing of ultrasonic images based on noise estimation.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Mackowey whose telephone number is (571) 272-7425. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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10/2/2005

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